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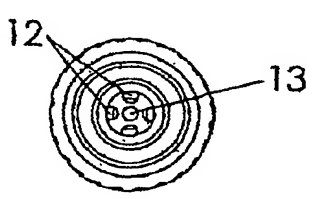
(54) Title: PRESSURE RELIEF VALVE



(57) Abstract: A pressure relief valve comprises of a substantially elongate valve body (1) with an internal air bleed chamber (2), an adjacent air bleed passage (3) and a tyre valve engagement means (4). The valve body (1) is provided with a cap (5) adjustably mounted to an open end of the air bleed chamber (2). A valve piston (6) is disposed within the air bleed chamber (2). A biasing spring (11) is mounted on the valve stem (9) and is compressed between the cap (5) and the valve piston (6). An air bleed hole (19) is provided in the wall of the valve body (1). A strike pin (13) extends from the tyre valve engagement means (4). When the valve body (1) is coupled to a two way valve (14) of a pneumatic tyre and the strike pin (13) contacts a needle (15) within the two-way valve (14) pressures can be reduced in proportion with a predetermined compression applied to the spring (11). The air bleed chamber (2) and cap (5) have complimentary external and internal threads (16). The compression of the spring (11) of the valve is adjusted according to the degree that the cap (5) is advanced on the air bleed chamber (2) thread (16).

PRESSURE RELIEF VALVE

TECHNICAL FIELD

This invention relates to pressure relief valves and has particular relevance to valves suitable for lowering pressures within pneumatic tyres.

BACKGROUND ART

It is important for motorists to regularly check that tyre pressures are even and in accordance with the specified pressures for particular driving conditions and circumstances.

Most service stations provide a free air service where motorists are able to check their air pressures and if necessary make adjustments to same.

Whilst increasing tyre pressures is a relatively straight forward matter, reducing pressures to a required level requires the motorist to depress the needle of a two way valve of each tyre to allow air to bleed and then to recheck with a pressure gauge that an appropriate pressure has been reached.

Most four-wheel drive and terrain vehicles are designed to be driven in off road situations with lower than normal tyre pressures.

Because the off road usages are generally in remote areas where air pumps and gauge facilities are unlikely to be available, in order to lower tyre pressures it is necessary for a driver to manually bleed off air from each tyre and to constantly check with a gauge the status of each tyre during the process.

It is easy for a motorist in these circumstances to inadvertently reduce the pressure to below the required rate. It would be convenient in these circumstances for motorists to have available a pressure relief valve which can be applied to the valve of each tyre of his vehicle and which ensure that the exact lower tyre pressure he requires is achieved speedily and accurately without the danger of deflation below an acceptable level.

In our Australian Petty Patent no. 719902 we have described our earlier pressure relief valve which, although functional, was slow to operate in

terms of the time it took to deflate a tyre and to shut off once the required level of deflation was reached.

It is an object of the present invention to provide an improved pressure relief valve which can be applied to the valve of a pneumatic tyre and which will provide for speedy and accurate deflation of the tyres to a predetermined level.

Further objects and advantages of the present invention will become apparent on the ensuring description which is given by way of example.

DISCLOSURE OF INVENTION

According to the present invention there is provided a a pressure relief valve comprising;

(a) a substantially elongate valve body having an internal air bleed chamber, an adjacent air bleed passage and a tyre valve engagement means,

(b) a cap adjustably attached to an open end of the air bleed chamber,

(c) a valve piston within the air bleed chamber said valve piston having a piston head which is adapted to engage with a valve seat located between the air bleed chamber and the air bleed passage and an extending piston stem the free end of which extends to and engages with a centralised aperture in the cap,

(d) a biasing spring mounted on the valve piston stem which is compressed between the cap and the valve piston and applies a continuous closing bias to the valve head,

(e) an air bleed hole in the wall of the valve body which is above and in close proximity to the valve seat, and

(f) a strike pin extending from the tyre valve engagement means the arrangement and construction being such that when the valve body is coupled to a two-way valve of a pneumatic tyre and the strike pin contacts a needle within

the two-way valve pressures within the tyre can be reduced in proportion with a predetermined compression applied to the spring, characterised in that the air bleed chamber and cap have complimentary external and internal threads and the compression of the spring of the valve is adjusted according to the degree that the cap is advanced on the air bleed chamber thread.

The valve can be a one piece metal valve having a valve head and a valve stem extending from the head providing a first spring mounting portion and a second cap engaging portion of reduced diameter which extends from the said first spring mounting portion.

The valve head can be close tolerance sliding fit in the internal air bleed chamber.

The air bleed hole can be approximate 1.5mm in diameter and is positioned approximately 1.25mm from top edge of the valve seat.

The valve head can be cylindrical and approximately 6mm deep.

The valve piston can be provided with a piston seal mounting at the end opposite to the stem.

BRIEF DESCRIPTION OF THE DRAWINGS

Aspects of the present invention will now be described by way of example only with reference to the accompanying drawings in which;

Figure 1 is a bottom view of a pressure relief valve in accordance with one aspect of the present invention, and

Figure 2 is a side view of a pressure relief valve of Figure 1, and

Figure 3 is a plan view of the pressure relief valve of Figure 1, and

Figures 4 and 4a are full and partial cross sections respectively of the valve of the present invention taken at IV:IV of Figure 3.

Figures 5, 6 and 7 are side, long-sectional and end views of a valve body according to the present invention, and

Figures 8 and 9 are side and end views of the valve of the valve piston for the valve of the present invention.

With respect to the relief valve in accordance with the present invention can comprise drawings a pressure a substantially elongate valve body generally indicated by arrow 1 having an internal bleed chamber 2 and adjacent air bleed passage 3 and tyre valve engagement means 4.

The valve body is provided with a cap 5 which is adjustably mounted to an open end of the air bleed chamber 2.

A valve piston generally indicated by arrow 6 is disposed centrally within the air bleed chamber said valve having a valve head 7 which is adapted to engage and seal a valve seat 8 located between the air bleed chamber 2 and the air bleed passage 3 and an extending valve stem 9 the free end 9a of which extends to and is reciprocal within a centralised aperture 10 in the cap 5.

A biasing compression spring 11 is mounted on the valve stem 9 and the spring is compressed between the cap 5 and the valve head 7 and applies a constant closing bias to the valve.

At the base of the air bleed chamber 3 there is provided one or more air passages 12 are provided and a centralised strike pin 13 extends outwardly the arrangement and construction being such that when the valve body 1 is coupled to a two way valve 14 and the strike pin 13 contacts the needle 15 of the valve pressures within the tyre (associated with the valve 14) can be reduced in proportion compression applied to the spring.

The air bleed chamber 2 and the cap 5 have complimentary external and internal threads 16 so that the position of the cap and thus the pressure on the spring can be adjusted to predetermined levels.

A locking washer 17 can also be fitted to the thread 16 to secure the cap in its desired position.

As the cap is wound off the thread 16 a predetermined distance "S" pressure on the spring 11 is reduced accordingly.

The surfaces of the thread and/or body or cap be marked to assist the user to select pressure ranges for the position and therefore the pressure on the compression spring can be adjusted by the use of a gauge or the like equating the distance S with specific pressures.

The internal walls of the engagement means 4 can be provided with a standardised internal thread which matches with the standard external thread of a two-way valve.

The body 1 of the valve can be moulded or fabricated or machined from metal.

The integrity of the valve seal can be enhanced by the provision of a compressible seal 18 fixed on an extending portion 9b of the stem 9 below the valve head 7.

The valve head 7 is a close tolerance sliding fit in the bore of the air bleed chamber and may be provided with compression rings or seals (not shown) similar to the pistons of a combustion engine.

Where this is the case an air bleed hole 19 can be provided in the wall of the valve body so that pressures within the chambers can be directly vented to atmosphere which will considerably reduce the time required to bleed air from a tyre to reach the required and predetermined pressure.

Our trials with the valve have indicated that tolerances and sizes of the valve componentry are relatively critical.

The depth of the valve head (piston) should be approximately 6mm when the air bleed chamber is approximately 16mm deep and 10mm in diameter.

The size of the bleed hole is ideally 1.5mm.

The spacing of the air bleed hole from the top edge of the valve seat should not exceed 1.25mm.

The tolerance between the outer diameter of the piston and the inner diameter of the air bleed chamber is minimal and in the order of .04mm.

Figures 5 to 7 of the drawings show the valve body in enlarged detail.

The spacing 51 between the top edge of the valve seat 8 is approximately 1.25mm.

It is preferred that the body and valve piston 6 illustrated by figures 8 and 9 is manufactured in similar metals.

The present invention allows accurate adjustment of tyre pressures, can be readily preset the user and reduce pressures in tyres can be elevated by the user by simply removing the relieve valves and re-inflating the tyres.

Aspects of the present invention have been described by way of example only and it will be appreciated that modifications and additions thereto may be made without departing from the scope thereof, as defined in the appended claims.

CLAIMS:

1. A pressure relief valve comprising;

(a) a substantially elongate valve body having an internal air bleed chamber, an adjacent air bleed passage and a tyre valve engagement means,

(b) a cap adjustably attached to an open end of the air bleed chamber,

(c) a valve piston within the air bleed chamber said valve piston having a piston head which is adapted to engage with a valve seat located between the air bleed chamber and the air bleed passage and an extending piston stem the free end of which extends to and engages with a centralised aperture in the cap,

(d) a biasing spring mounted on the valve piston stem which is compressed between the cap and the valve head and applies a continuous closing bias to the valve piston,

(e) an air bleed hole in the wall of the valve body which is above and in close proximity to the valve seat, and

(f) a strike pin extending from the tyre valve engagement means the arrangement and construction being such that when the valve body is coupled to a two-way valve of a pneumatic tyre and the strike pin contacts a needle within the two-way valve pressures within the tyre can be reduced in proportion with a predetermined compression applied to the spring, characterised in that the air bleed chamber and cap have complimentary external and internal threads and the compression of the spring of the valve is adjusted according to the degree that the cap is advanced on the air bleed chamber thread.

2. A pressure relief valve as claimed in claim 1 wherein the valve piston is a one piece metal valve having a valve head and a valve stem extending from the head providing a first spring

mounting portion and a second cap engaging portion of reduced diameter which extends from the said first spring mounting portion.

3. A pressure valve as claimed in claim 1 wherein the valve head is a close tolerance sliding fit in the internal air bleed chamber.

4. A pressure relief valve as claimed in claim 1 wherein the air bleed hole is approximately 1.5mm in diameter and is spaced approximately 1.25mm from the top edge of the valve seat.

5. A pressure relief valve as claimed in claim 1 wherein the valve head is cylindrical and approximately 6mm deep.

6. A pressure relief valve as claimed in claim 1 wherein the valve piston is provided with a piston seal mounting at the end opposite to the stem.

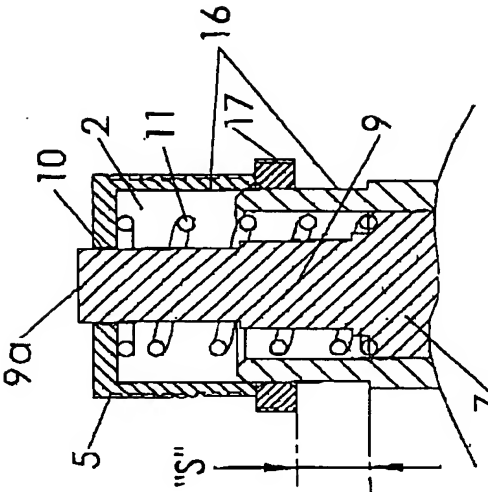
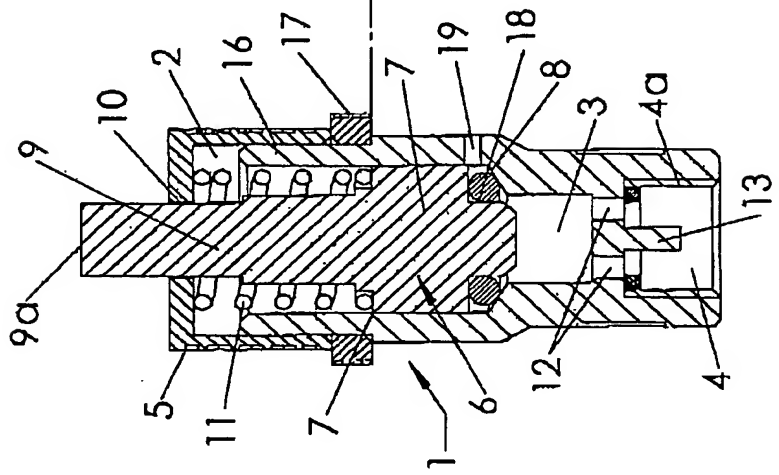


FIG-4a-



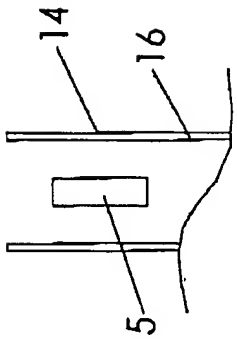


FIG-4-

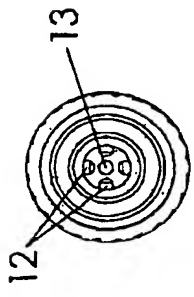


FIG-1-

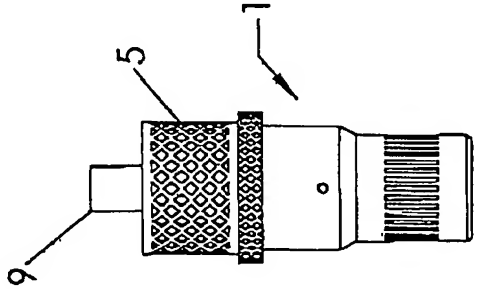


FIG-2-

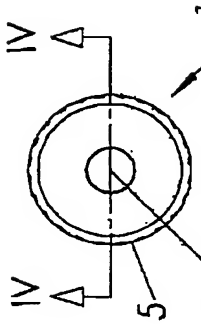


FIG-3-

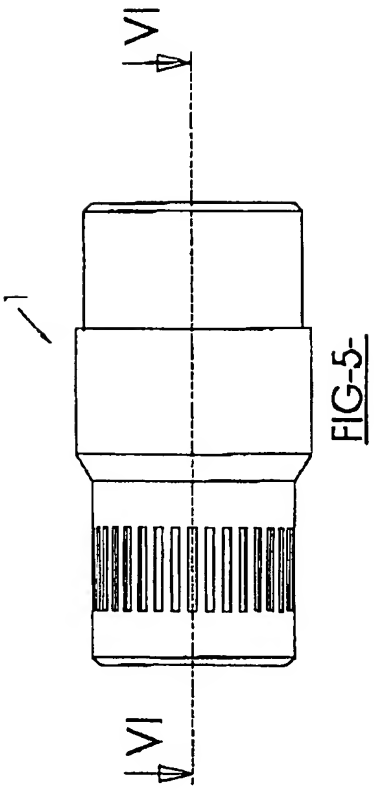


FIG-5-

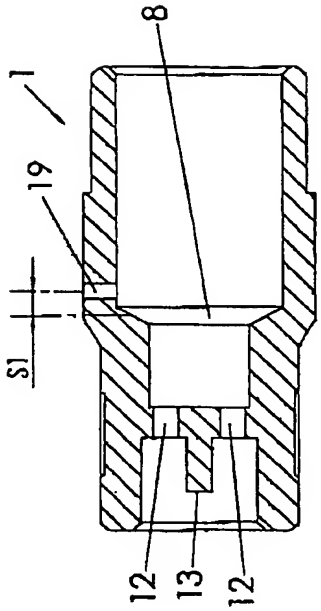


FIG-6-

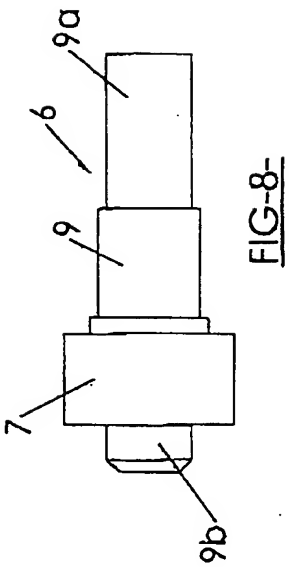


FIG-8-

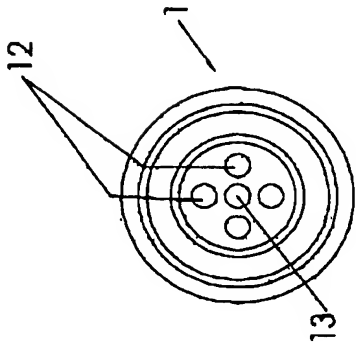


FIG-7-

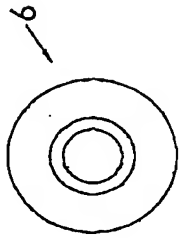


FIG-9-

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/00112

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: B60C 23/00, 29/06; F16K 15/20, 17/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: IPC B60C 23/00, 29/06; F16K 15/20, 17/06

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: IPC (F16K-015/IC OR F16K-017/IC OR B60C-023/IC OR B60C-029/IC) and Keywords: (TIRE OR TYRE OR TUBE) AND PRESSURE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	AU 53534/99 (719902) B (GRANT et al) 18 May 2000 Page 3 line 4 to page 5 line 18, claim 1 and figure 4	1-6
Y	US 6079519 A (LOTTES) 27 June 2000 Column 2 line 55 to column 3 line 38, claim 1 and figures 1 & 2	1-6
Y	US 5694969 A (DE VUYST) 9 December 1997 Column 3 lines 21 - 40, claim 1 and figures 1 & 2	1-6

☐ Further documents are listed in the continuation of Box C ☐ See patent family annex

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Date of the actual completion of the international search	Date of mailing of the international search report
15 May 2002	21 MAY 2002
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **LIONEL BOPAGE** Telephone No : (02) 6283 2153